Harding Lawson Associates

September 15, 1997

Baldwin Park Operable Unit Steering Committee

DRAFT REPORT
The Distribution and Treatability of
Perchlorate in Groundwater
Baldwin Park Operable Unit
San Gabriel Basin

Ladies and Gentlemen:

Page nine of subject report distributed July 15, 1997 was missing half of the first paragraph. A replacement page is enclosed.

We apologize for any inconvenience caused.

Yours very truly,

HARDING LAWSON ASSOCIATES

Julia H. Slater
Secretary to John G. Catts, Ph.D.

Two biochemical reduction methods were tested: a fixed film bioreactor using submerged plastic media, and a granular activated carbon/fluidized bed (GAC/FB). For both processes the water to be treated was amended with an organic carbon source (acetate or ethanol) and nutrients (nitrogen and phosphorus) before entering the bioreactor.

Both biochemical reduction methods were shown to be effective in reducing perchlorate concentrations. The GAC/FB system was better at responding favorably to system changes and also accommodated a higher (6-fold) perchlorate loading rate. Effluent from both processes were below a 400 μg/L reporting limit for perchlorate.

Because of the success with the biochemical treatment methods, and due to the comparatively better performance of the GAC/FB method, this method was taken to pilot-scale.

4.2.3 Pilot-Scale Testing

In 1996, a 30 gpm skid-mounted pilot system, was set up at the Aerojet facility in Sacramento.

The pilot-scale system operated between April and December of 1996. Operation of this pilot-scale system allowed optimization of feed rates for the organic carbon source (ethanol) and nutrients (nitrogen in the form of ammonium chloride and phosphorus in the form of dibasic sodium biphosphate). Ethanol was required in an ethanol to perchlorate molar ratio of approximately 4:1, while nitrogen and phosphorus levels were similar to those described in the literature to support microbial activity.

Effluent concentrations were consistently less than a 400 μg/L reporting limit for perchlorate, 500 μg/L for phosphorus, 340 μg/L for ammonia-nitrogen, and less than 50 μg/L for nitrate-nitrogen.

The initial pilot-scale effluent contained very low or nondetectable levels of E. coli bacteria. After one month of operation, all E. coli measurements showed nondetectable levels. Regardless, disinfection of treatment system effluent was envisioned for a full-scale system.

4.2.4 Full-Scale Design

Aerojet is in the process of designing a full-scale perchlorate treatment system for one of the groundwater extraction and treatment systems at their Sacramento facility. The design is expected to be complete in July 1997, and construction is currently scheduled to be complete in the summer of 1998. The system loading rate is 1,500 gpm. The full-scale system will be similar to that pilot-tested in 1996.

Aerojet is working with the design contractor to optimize certain design features and to lower effluent concentrations. The pilot-scale study was completed prior to the recent reduction in MDLs by agency and commercial laboratories and, therefore, Aerojet and its contractor are hoping to modify either the design or operating parameters to produce effluent below the 18 μg/L provisional action level.

In addition, Aerojet and its contractor have evaluated alternative sources of microorganisms to eliminate possible problems with the potential introduction of pathogens associated with wastewater treatment plant sludge. Waste sludge from a baby food processing facility was determined to contain acceptable microorganisms thus eliminating the potential for pathogens to be present in treatment effluent.